COILING AND FORM IN SOUTH AUSTRALIAN LABECERATIDAE (ALBIAN; CRETACEOUS)

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SUMMARY

Observations are presented on the mode of coiling and the shell form of some typical labeceratid ammonites from the Albian of Fossil Creek, near Oodnadatta.

There has been a recent awakening of interest in Lower Cretaceous heteromorphic ammonites. Wiedmann (1962) has published a rather far-going revision of many heteromorphs, including Labeceratidae, which he prefers to see as a subfamily of Anisoceratidae. The purpose of the present note is to present certain observations on the mode of coiling and shell form, particularly of the apertural region, of a few typical labeceratids, selected from a large collection of ammonites from South Australia, the taxonomic examination of which is the subject of the foregoing paper.

The ammonites derive from a limestone in Fossil or Woolridge Creek near Oodnadatta, South Australia.

It is not here proposed to enter into any form of phylogenetic discussion. Suffice it to say that the writer is largely in agreement with Wiedmann's analysis of Anisoceratidae and related groups.

In order to assist the representation of the ammonites approximate stereoscopic photographs were made. Shadows tend to reduce the clarity of stereoscopic pictures of fossils. In an attempt to minimise the development of shadows an electronic flash apparatus, mounted to the camera, was used (film Kodak 23 DIN). Coating with sal ammoniac gave unsatisfactory results owing to the excessive reflection from the pure white surface produced. Better results were obtained by using medium grey poster colour. Specimens are deposited in the museum of the Geological Survey of South Australia.

Labeceras crassum Spath.

Pl. 1, fig. 5; pl. 2, fig. 2a-b (stereopair)

Labeceras is coiled in roughly ancyloceratoid form; some species are morphologically not unlike certain *Idiohamites*, the youngest part of the shell usually forming less than one whorl. The initial part is generally spirally coiled, but

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may appear planispiral. The stereopair in Pl. 2, Fig. 2a-b, show the form of an almost complete specimen, and the nature of the aperture. The body chamber begins at the point marked by an arrow in Pl. 1, Fig. 5. It is here worth noting, that although *Labeceras* mostly has the aperture directed towards the shaft, *L. oodnadattaensis* sp. nov. (Reyment, 1964) has the aperture directed outwards.

Fig. 1 shows the plot of shell length against shell height. We observe that these two variables are not linearly related; that is, whorl height and shell length do not increase regularly with respect to each other. The correlation coefficient, computed from the logarithmically transformed measurements, is 0·9728, which is highly significant.

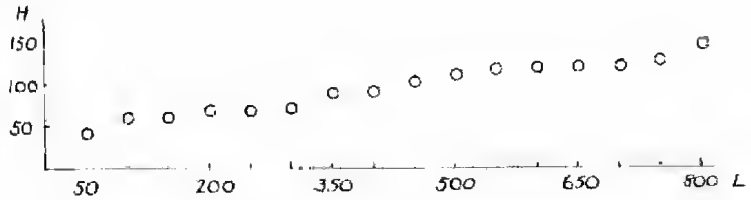

Fig. 1. Relationship between length and height of shell of *Labeceras crassum* Spath. In this Fig. and Figs. 2 and 3, the units are (mm x 10).

Myloceras davidi Whitehouse

Pl. 1, fig. 3a-b (stereopair); pl. 2, fig. 1a-b (stereopair)

The specimen figures in Pl. 1, Fig. 3a-b, and Pl. 2, Fig. 1a-b shows the form of the uncoiled part of a shell, including the aperture. The shell height increases at first on the body chamber and then ceases to increase towards the aperture. The plot of shell height against shell length is shown in Fig. 2; it will be observed that there is some departure from an even growth relationship. The correlation coefficient, computed from the logarithmically transformed variables, is 0·6671, which is significant on the 1 per cent level.

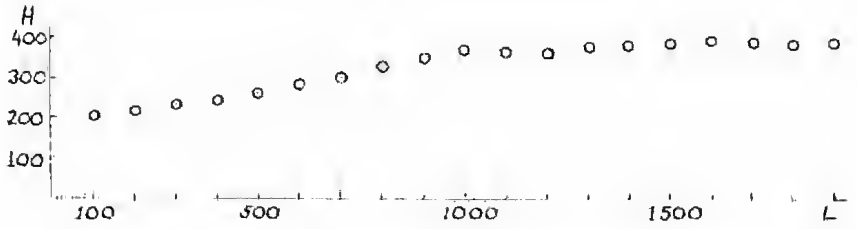

Fig. 2. Relationship between length and height of shell of *Myloceras davidi* Whitehouse.

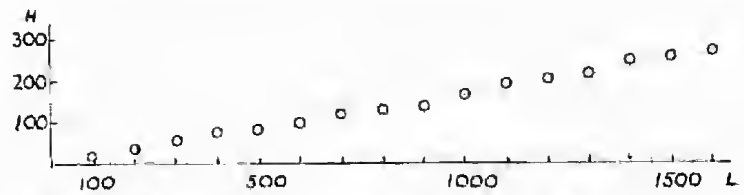

Fig. 3. Relationship between length and height of shell of *Myloceras ammonoides* (Etheridge).

Myloceras ammonoides (Etheridge)

Pl. 1, fig. 1a-b (stereopair), fig. 2a-b (stereopair); fig. 4; pl. 2, figs. 3-5.

This specimen shows well the spiral coiling of the early part of *Myloceras* (Pl. 1, Fig. 2a-b; Pl. 2, Figs. 3, 5); this is not so clearly apparent in all species. The specimen consists of the three initial whorls—the shaft and the hook are missing. The whorls are barely in contact and in places do not touch (Pl. 1, Fig. 1a-b—space between dorsum of last whorl and venter of penultimate whorl in the upper part of the specimen). The plot of shell length against shell height in Fig. 3 shows an almost completely regular increase relationship to exist between the two variables. The correlation coefficient, computed from logarithmically transformed observations, is 0·9579, which is very highly significant.

REMARKS

The scattergrams of length and height of whorl suggest that one might expect some sort of differential growth relationship between these variables. The regression equations for each species were computed to yield for:

Labeceras crassum: $y = 6{\cdot}76x^{0.44}$;
Myloceras davidi: $y = 67{\cdot}61x^{0.23}$;
Myloceras ammonoides: $y = 0{\cdot}28x^{0.91}$.

We have here the interesting result that the coiled whorls of *Myloceras ammonoides* grow almost isometrically with respect to length and height of shell, whereas the uncoiled parts of *Labeceras crassum* and *Myloceras davidi* grow in some kind of allometric relationship.

Another interesting feature of the present analysis is that log length and log height of shell are highly correlated for the shaft and crook of *L. crassum* and for the whorls of *M. ammonoides*, but less strongly correlated for the shaft and crook of *M. davidi*.

REFERENCES

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Wiedmann, J., 1962: Unterkreide-Ammoniten von Mallorca. 1. Lieferung: Lytoceratina, Aptychi. Abh. Math. N.W.-Klasse, Jahrgang 1962; Akad. Wiss. nit., Mainz, 148 pp., 10 pls.

EXPLANATION OF PLATES

Plate 1

Fig. 1a-b. *Myloceras ammonoides* (Etheridge). Stereopair. X0·62. Coated.

Fig. 2a-b. Same species. Stereopair. X0·62. Coated. G.S.S.A. M 1497.

Fig. 3a-b. *Myloceras davidi* Whitehouse. Approximate stereopair. X0·65. Coated. G.S.S.A. M 1495.

Fig. 4. *Myloceras ammonoides* (Etheridge). X0·58. Uncoated. G.S.S.A. M 1497.

Fig. 5. *Labeceras crassum* Spath. The arrow marks the end of the septate part of the shell. Approximately natural size. Uncoated. G.S.S.A. M 1494.

Plate 2

Fig. 1a-b. *Myloceras davidi* Whitehouse. Approximate stereopair. X0·65. Coated. G.S.S.A. M 1495.

Fig. 2a-b. *Labeceras crassum* Spath. Stereopair X0·65. The impression of a shaft of the same species occurs in the upper left-hand corner. Uncoated. G.S.S.A. M 1494.

Figs. 3-5. *Myloceras ammonoides* (Etheridge). Figs. 3 and 5 show clearly the spiral coiling of the younger part of the shell. X0·58. Uncoated. G.S.S.A. M 1497.